

Tumor Growth

Tumor growth refers to the **progressive increase in size and cellularity** of a neoplasm due to uncontrolled proliferation of abnormal cells. It is driven by genetic mutations, altered signaling pathways, and evasion of growth-suppressing mechanisms.

Growth Kinetics

- **Gompertzian growth model:** Tumors grow rapidly in early stages, then slow as they outgrow their blood supply
- **Doubling time:** Varies by tumor type and biological behavior
- **Tumor burden:** Total number or volume of cancer cells present

Hallmarks of Tumor Growth

- **Sustained proliferative signaling** (e.g., EGFR, KRAS, BRAF)
- **Evading growth suppressors** (e.g., p53, RB)
- **Resisting cell death** (e.g., BCL2 overexpression)
- **Enabling replicative immortality** (e.g., telomerase activation)
- **Inducing angiogenesis**
- **Activating invasion and metastasis**

Key Molecular Pathways

- **PI3K/AKT/mTOR**
- **RAS/RAF/MEK/ERK (MAPK pathway)**
- **EGFR signaling**
- **MYC oncogene**
- **Wnt/ β -catenin**

Tumor Microenvironment (TME)

- Stromal cells, immune cells, and blood vessels interact with tumor cells to promote:
 - Growth
 - Immune evasion
 - Angiogenesis
 - Therapy resistance

Imaging and Measurement

- **Radiological assessment:** MRI, CT, PET
- **Response criteria:** RECIST 1.1 (Response Evaluation Criteria in Solid Tumors)

- **Biomarkers:** Ki-67 (proliferation index), LDH, PSA, CA-125, etc.

Therapeutic Implications

- **Cytotoxic agents:** Kill proliferating cells (e.g., alkylating agents, antimetabolites)
- **Targeted therapies:** Block growth-promoting pathways (e.g., EGFR, BRAF inhibitors)
- **Immunotherapies:** Stimulate immune system to suppress or eliminate tumors
- **Radiotherapy:** Damages DNA in rapidly dividing tumor cells

Related Topics

- [Proliferation Index \(Ki-67\)](#)
- [EGFR Pathway](#)
- [Angiogenesis](#)
- [Tumor Microenvironment](#)
- [Targeted Therapy](#)
- [RECIST Criteria](#)

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